BARK BEETLE-CAUSED IMPACTS TO PIÑON PINE WOODLANDS IN MEXICO: A COLLABORATIVE EFFORT BETWEEN FOREST HEALTH PROTECTION (FHP) AND COMISIÓN NACIONAL FORESTAL (CONAFOR)

FINAL REPORT TO INTERNATIONAL ACTIVITY TEAM

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Purpose:
The purpose of the collaborative work between USFS FHP and Mexico CONAFOR is to thoroughly document bark beetle-caused impacts to piñon pine woodlands. Currently, a Forest Health Monitoring-funded effort is underway to quantify levels of piñon pine (*Pinus edulis, P. monophylla*) mortality caused by the pinyon ips throughout the western United States. FHP offices in Regions 2, 3, 4 and 5 are working together to complete this task through an extensive network of ground plots aimed at providing a rigorous estimation of tree mortality and associated changes to piñon-juniper (PJ) woodlands and broad-based aerial detection surveys. Discussions by FHP and CONAFOR at the 2003 joint National Symposium on Forest Parasites-Western Forest Insect Work Conference in Guadalajara, Mexico fostered an understanding that extensive piñon pine mortality is occurring across all species of piñon (i.e., those mentioned above plus *P. quadrifolia* and possibly *P. cembroides* in Mexico) on both sides of the border. We proposed to extend our collaborative efforts from the western United States into two states of Mexico (Baja California and Sonora). We requested funds from the International Activity Team to enable three FHP entomologists to travel to Mexico to train CONAFOR personnel in the ground-based methods being used in the western United States. We have requested additional funding from other sources (e.g., Forest Health Monitoring) to purchase supplies, equipment, and to provide salary monies for seasonal help in Mexico.

Additional discussion between FHP and CONAFOR occurred at the national Forest Health Monitoring meeting in Sedona, Arizona on February 10, 2004. We talked about the best location and dates for the training to take place. We also met with the program director of Forest Health Monitoring (Borys Tkacz) to discuss potential opportunities for funding future work related to this project. Moreover, this meeting provided an opportunity to coordinate with efforts being made to train CONAFOR personnel in aerial survey techniques. Our proposed work will also provide a critical link between Aerial Detection Survey training that will take place in the same location as the ground-based plot work.

Travel Dates:
The dates for training and collaborative discussion occurred during 12 - 18 September 2004. We met at the CONAFOR facilities in Ensenada and in Laguna Hansen, which is located within the Parque Nacional Constitution de 1857, Baja California, Mexico.

Description:
We proposed to travel to Baja California, Mexico to meet and train CONAFOR personnel in the ground-based techniques and equipment currently being used across the western United States to measure bark beetle-caused impacts to piñon pine woodlands.

Our travel itinerary to Mexico included:

1. Meeting with CONAFOR staff (Jaime Villa-Castillo, David Quiroz Reygadas, Jesus Mario Mendoza Chacon, Felipe, and Francisco Bonilla Torres) in Ensenada, Baja California, Mexico on September 12, 2004 (***Figure 1***).

2. On September 13, FHP and CONAFOR staff traveled from Ensenada to Laguna Hansen.
3. On September 14, FHP staff trained CONAFOR staff on methodology being used to measure bark beetle impacts on piñon-juniper woodlands in the Southwestern United States.
4. On September 15 and 16, CONAFOR staff began installing bark beetle impact plots with the assistance and guidance of FHP staff.
5. On September 17, CONAFOR and FHP staff discussed a proposal to be submitted to US Forest Health Monitoring.
6. Return travel to US.

***Figure** 1. Pictures taken during International Activity Team-funded trip to Baja California. Representatives from CONAFOR and FHP in Ensenada (top left), installing bark beetle impact plot (top right), and landscape level piñon mortality near Laguna Hansen (bottom right).*

Specific accomplishments and findings from our IAT-funded trip include:

1. CONAFOR personnel learned how to use forestry field equipment and techniques for installing fixed radius plots and belt transect surveys.
2. An electronic data form specific to the study in Mexico was developed and is now uploaded to data recorders being used by CONAFOR personnel.
3. A Spanish-English glossary of bark beetle and tree damage terminology was developed.
4. In addition, to documenting the impacts of bark beetles on piñon pine, it became apparent that mortality of Jeffery pine (caused by pine engraver beetles, *Ips pini*) and yucca plants (caused by an unidentified large, black weevil) was also

occurring in the Laguna Hansen, Sierra de Juarez Mountains area (***Figure 2***). Similar to the effects of the piñon mortality, death of these other species is having impacts on the local Ejido communities. The bark beetle impact plots being installed will also document the level of mortality to these other plant species.

5. Forestry personnel working at Laguna Hansen learned identification of bark beetles and twig beetles attacking piñon pine and Jeffery pine.
6. A Forest Health Monitoring proposal was completed based on this trip and submitted for review in September 2004.
7. A poster documenting this collaborative work was presented at the Southwestern Regional Centennial Forum on Global Connections conference in Albuquerque, New Mexico in November 2004 (Funding from IAT was acknowledged on poster).

McMillin, J., J. Villa-Castillo, D. Quiroz Reygadas, T. Eager, S. Smith & D. Cluck. 2004. Bark beetle-caused impacts to piñon pine woodlands in Mexico: A collaborative effort between Forest Health Protection (FHP) and Comisión Nacional Forestal (CONAFOR). Southwestern Regional Centennial Forum on Global Connections. 8 – 9 November 2004 in Albuquerque, NM.

Figure 2. *Yucca plant mortality (right) caused by weevils (top).*

The funded project had the following additional benefits to the US Forest Service FHP and the Mexican CONAFOR:

1. Fostered international relationships between USFS and CONAFOR by bringing entomologists together from both countries. Additional Mexican partners involved in this project will include SEMARNAT (Secretaria de Medio Ambiente y Recursos Naturales) and the State of Baja California.
2. Fostered international cooperation between USFS FHP and CONAFOR. One main conclusion from the joint meeting in Guadalajara was the need for increased cooperation between the countries. Our project promoted such cooperation on a forest health issue that is occurring across both sides of the border.
3. In addition to Mexico having benefited by the training of CONAFOR personnel on techniques and equipment being used in the United States, CONAFOR personnel are planning to attend future Forest Health Monitoring conferences in the US.
4. This international cooperative work promoted the professional development of FHP entomologists in three Forest Regions across the western United States.

Costs:

Joel: Travel from Flagstaff, Arizona to Baja California, Mexico.	$1,545.00
Tom: Travel from Gunnison, Colorado to Baja California, Mexico.	$1,600.00*
Sheri: Travel from Susanville, California to Baja California, Mexico.	$1,179.00
Total:	**$4,324.00**

*Approximate cost.